UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CHARLES H. HONEYMAN, ELIZABETH A. MORAN, LIBING ZHANG, ANTHONY EDWARD PULLEN, EMILY J. PRATT, KIMBERLY L. HOUDE, MATTHEW A. KING, CRAIG A. HERB, and RICHARD J. PAOLINI, JR.

Appeal 2007-0217
Application 10/711,278
Technology Center 1700

Decided: December 15, 2006

Before EDWARD C. KIMLIN, CHARLES F. WARREN, and CATHERINE TIMM, *Administrative Patent Judges*.

KIMLIN, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1, 8-20, 35 and 37-42. Claims 1 and 35 are illustrative:

1. A process for producing a polymer-coated pigment particle, which process comprises:

(a) reacting the particle with a reagent having a functional group capable of reacting with, and bonding to, the particle, and also having a polymerizable or polymerization-initiating group, thereby causing the functional group to react with the particle surface and attach the polymerizable group thereto;

(b) reacting the product of step (a) with at least one monomer or oligomer under conditions effective to cause reaction between the polymerizable or polymerization-initiating group on the particle and the at least one monomer or oligomer, thereby causing the formation of polymer bonded to the particle; and

(c) dispersing the polymer-coated pigment particle into a suspending fluid to form an electrophoretic medium.

35. A process for producing a polymer-coated titania particle, which process comprises:

(a) reacting the titania particle with a reagent having a functional group capable of reacting with, and forming a covalent bond to, the particle, and also having a polymerizable or polymerization-initiating group, thereby causing the functional group to react with the particle surface and attach the polymerizable group thereto via a covalent bond; and

(b) reacting the product of step (a) with at least one monomer or oligomer under conditions effective to cause reaction between the polymerizable or polymerization-initiating group on the titania particle and the at least one monomer or oligomer, thereby causing the formation of polymer bonded to the titania particle.

The Examiner relies upon the following references in the rejection of the appealed claims:

Herman	US 3,884,871	May 20, 1975
Uytterhoeven	US 4,663,265	May 5, 1987
Sakai	US 5,750,258	May 12, 1998
Devonport	US 6,103,380 A	Aug. 15, 2000
Matyjasjewski	US 6,121,371 A	Sep. 19, 2000
Katoh	US 6,514,328 B1	Feb. 4, 2003

Appellants' claimed invention is directed to a process for producing a polymer-coated pigment particle and dispersing the particle into a suspending fluid to form an electrophoretic medium. Appealed claim 35 is limited to a titanium particle but does not include the step of dispersing the polymer-coated pigment particle into the suspending fluid. The particle is reacted with a reagent which has a functional group that reactively bonds to the particle as well as a polymerizable or polymerization-initiating group. The particle/reagent product is reacted with a monomer or oligomer which results in the formation of a polymer bonded to the particle.

The appealed claims stand rejected under 35 U.S.C. § 103(a) as follows:

(a) claims 1, 8-11, 14 and 15 over Devonport or Sakai in view of Uytterhoeven,

(b) claims 1, 8, 11-13, 19 and 20 over Devonport over Uytterhoeven,

(c) claims 13 and 15-18 over Devonport in view of Uytterhoeven and Matyjasjewski, and

(d) claims 35-42 over Katoh in view of Sakai.

Also, claims 35, 36, 39, and 40 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Herman.

Appellants do not set forth separate arguments for the groups of claims separately rejected by the Examiner. Accordingly, the groups of claims separately rejected by the Examiner stand or fall together.

We consider first the Examiner's § 103 rejection of claims 1, 8-11, 14, and 15 over Devenport or Sakai in view of Uytterhoeven. Appellants do not dispute the Examiner's factual determination that both Devenport and Sakai disclose polymer-coated pigment particles within the scope of the appealed claims. Rather, it is Appellants' argument that Sakai does not teach or suggest dispersing the polymer-coated pigment particles in a suspending fluid to form an electrophoretic medium, and that there was no reason why "a skilled person would attempt to use the Sakai particles in an electrophoretic medium" (Br. 17, ¶ 3).

We agree with the Examiner that the polymer-coated particles fairly taught by Sakai would have been reasonably expected by one of ordinary skill in the art to be suitable for forming a dispersion in a non-polar suspending fluid to form an electrophoretic medium. As explained by the Examiner, Sakai teaches that the outer polymer coating on the silica particles may be a monofunctional vinyl monomer, such as styrene and acrylic acid esters, e.g., methacrylate, propyl acrylate, etc. (Sakai, col. 12, et seq.). Uytterhoeven, as acknowledged by Appellants, discloses polymer coated particles that are dispersed in a non-polar carrier liquid to form an electrophoretic medium and teaches, like Sakai, that the outer polymer layer may be derived from non-ionic monomers such as alkyl styrenes and alkyl acrylates (Sakai, col. 4, ll. 1 et seq.). Accordingly, since both Sakai and Uytterhoeven disclose polymer-coated particles wherein the outer polymer coating is derived from non-ionic monomers, such as styrene and

alkylacrylates, we concur with the Examiner that there is factual basis for concluding that one of ordinary skill in the art would have reasonably expected that polymer-coated particles fairly taught by Sakai would be appropriate for dispersing in a suspending fluid to form an electrophoretic medium. As for Appellants' argument that "[t]here is no indication in Sakai that the particles carry any electric charge" (Br. 17, ¶ 1), Appellants have not refuted the Examiner's finding that one of ordinary skill in the art would have readily charged the polymer-coated particles of Sakai "by absorbing oil-soluble inorganic substances to portion B solvatable in non-polar liquid" in order to form an electrophoretic dispersion.

We will also sustain the Examiner's rejection over Devonport in view of Uytterhoeven. Devonport, like Appellants, discloses a process for making a polymer-coated pigment particle by reacting the particle with a reagent having a functional group capable of reacting with the particle, as well as a polymerizable or polymerization-initiating group that reacts with a monomer or oligomer to cause formation of a polymer bonded to the particle. As with Sakai, Devonport teaches that the outer polymer coating may be derived from styrene and alkyl acrylates, among other hydrophobic materials (Devonport, col. 8, ll. 48 et seq.) Hence, based on the Uytterhoeven teaching above regarding the nature of the outer polymer coating on a particle to be dispersed in an electrophoretic medium, we agree with the Examiner that one of ordinary skill in the art would have reasonably expected that the polymer-coated particles of Devonport, which are taught to be used in printing inks and toners, would be suitable for dispersion in an electrophoretic medium. Also, we find that the use as toners disclosed by

Devonport would have suggested the use in liquid electrophoretic developer compositions of the type disclosed by Uytterhoeven.

Appellants have not set forth a separate substantive argument for the § 103 rejection of claims 13 and 15-18 over Devonport in view of Uytterhoeven and Matyjasjewski.

We will also sustain the Examiner's § 103 rejection of claims 35-42 over Katoh in view of Sakai for essentially those reasons expressed by the Examiner. Appellants do not contest the Examiner's factual finding that Katoh discloses "a process for producing a polymer-coated pigment powder 20 for dispersing into a suspending fluid to form an electrophoretic medium or liquid crystal device" (Answer 8, ¶ 3), and that the process includes covalently bonding a polymeric layer 21, such as polymethacrylate, to the surface of the pigment powder by coating, chemical adsorption using Appellants' silane coupling agent, vinyltriethoxysilane, or graft polymerization. While Katoh does not expressly teach that the polymer coating may be formed by copolymerizing a monomer with the polymerizable group of a silane coupling agent, we fully concur with the Examiner that Sakai evidences the obviousness of doing so. Appellants contend that "[t]here is no logical reason why a skilled person, seeking to improve the Katoh coated titania particles, would assume that Sakai is relevant [since] Sakai is concerned solely with controlling the surface properties of silica properties to render them more suitable for use as spacers in liquid crystal displays, whereas Katoh is concerned with coating titanium particles to adjust their relative affinities for two immiscible suspending fluids (typically water and hydrocarbon) in an electrophoretic display" (Brief 20, ¶ 2) . However, as properly noted by the Examiner, "Katoh is concerned

with coating not only of titania particles (See col. 17, lines 4-5) but also titanium oxide coated with a **silicon oxide** (See col. 17, line 6)" (Answer 11, last ¶). Also, the Examiner correctly explains that Katoh is concerned with a display medium, which includes a liquid crystal and an electrophoretic migration device (Katoh col. 1, ll. 16-25).

Concerning all the § 103 rejections, we note that Appellants base no arguments upon objective of nonobviousness, such as unexpected results.

Finally, we will sustain the Examiner's § 102 rejection of claims 35, 36, 39, and 40 over Herman. Appellants do not dispute the Examiner's factual finding that Herman discloses a process for preparing polymer-coated titanium oxide pigment particles which comprises adding an anchoring agent having polar groups that are strongly absorbed on the pigment surface, and a polymerizable group that is copolymerizable with a monomer. Appellants maintain that the anchoring agent of Herman "is simply adsorbed on to the titania surface by ionic interactions and is not bonded to the surface via a covalent bond, as required by present claims 35 and 39-40" (Br. sentence bridging pp. 20-21). However, Appellants have not refuted the Examiner's reasoning that is well known in chemistry that the OH-group-containing titanium dioxide surface chemically bonds with the COOH groups of Herman's anchoring agent. Furthermore, we agree with the Examiner that one of ordinary skill in the art would interpret "strongly adsorbed" to include the formation of a covalent bond in view of Katoh's teaching referenced by the Examiner wherein the terms covalent bonding and chemical adsorption are used interchangeably.

As a final point, in the event of further prosecution of the subject matter at bar, such as by way of a continuing application, the Examiner

should consider a rejection of claims 1 and 8-20 under 35 U.S.C. § 103(a) as being unpatentable over Katoh in view of Sakai based on the rationale set forth in the rejection of claims 35-42.

In conclusion, based on the foregoing and the reasons well stated by the Examiner, the Examiner's decision rejecting the appealed claims is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

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